FIG.1

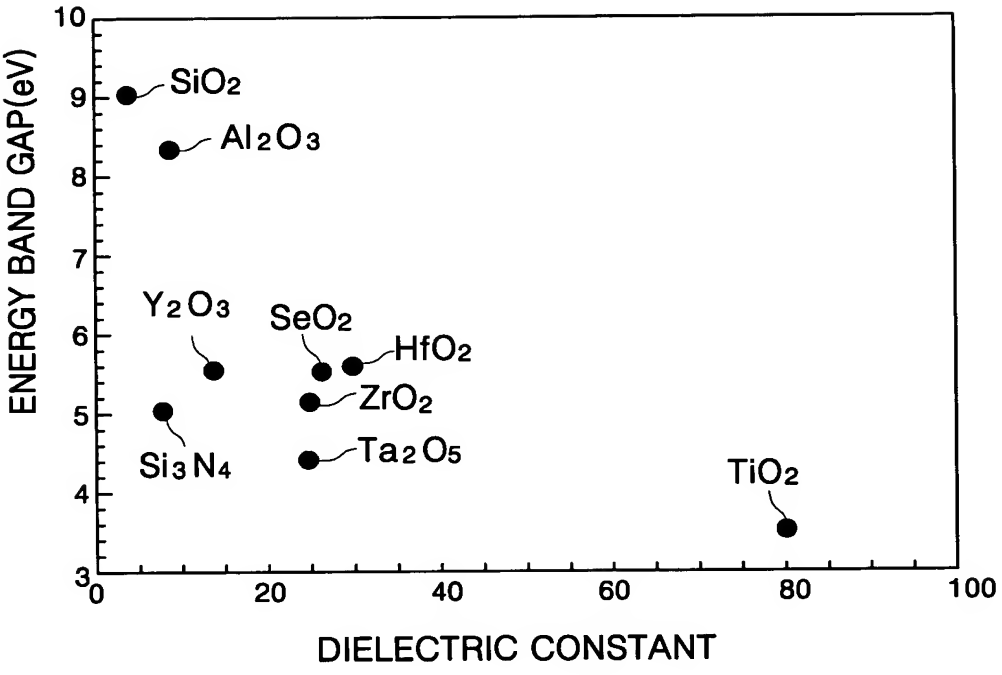

ENERGY BAND GAP(eV)
10
9
8
7
6
5
4
3
0
20
40
60
80
100
DIELECTRIC CONSTANT
SiO2
Al2O3
Y2O3
SeO2
HfO2
ZrO2
Ta2O5
Si3N4
TiO2

FIG.2A

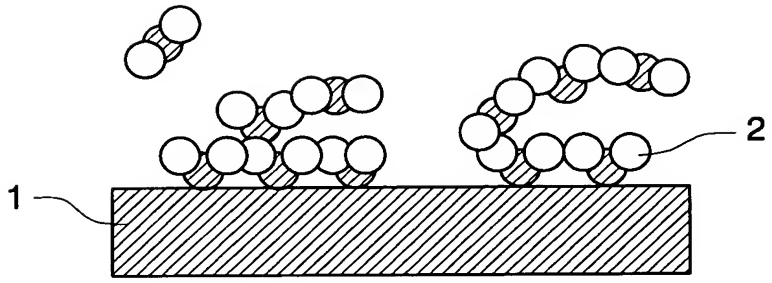


FIG.2B

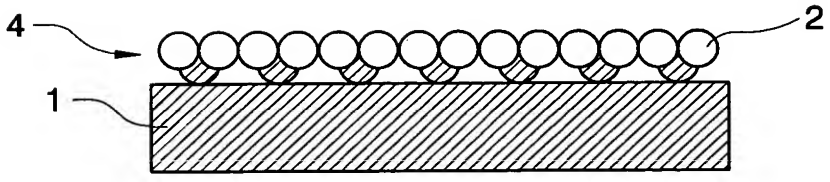


FIG.2C

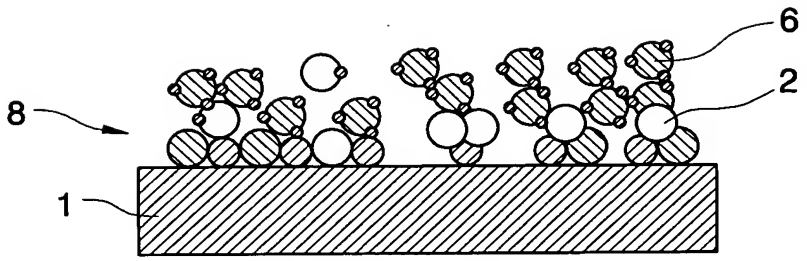


FIG.2D

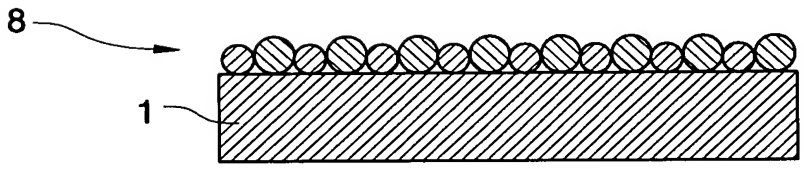


FIG.2E

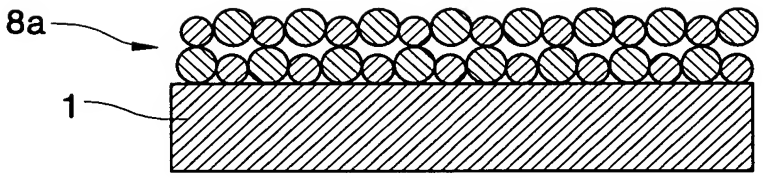


FIG.3

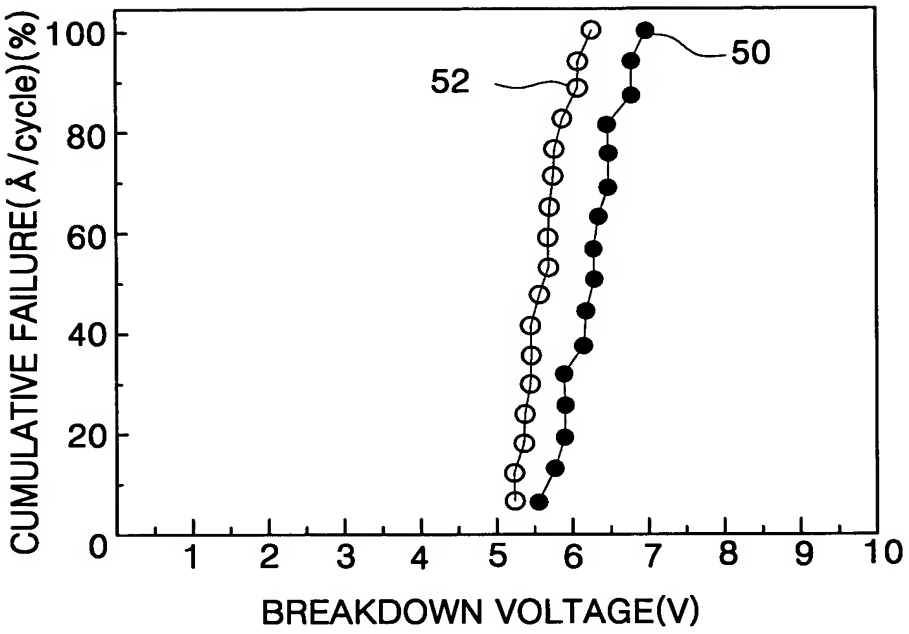

CUMULATIVE FAILURE(Å/cycle)(%)
100
80
60
40
20
0
1
2
3
4
5
6
7
8
9
10
BREAKDOWN VOLTAGE(V)
52
50

FIG.4A

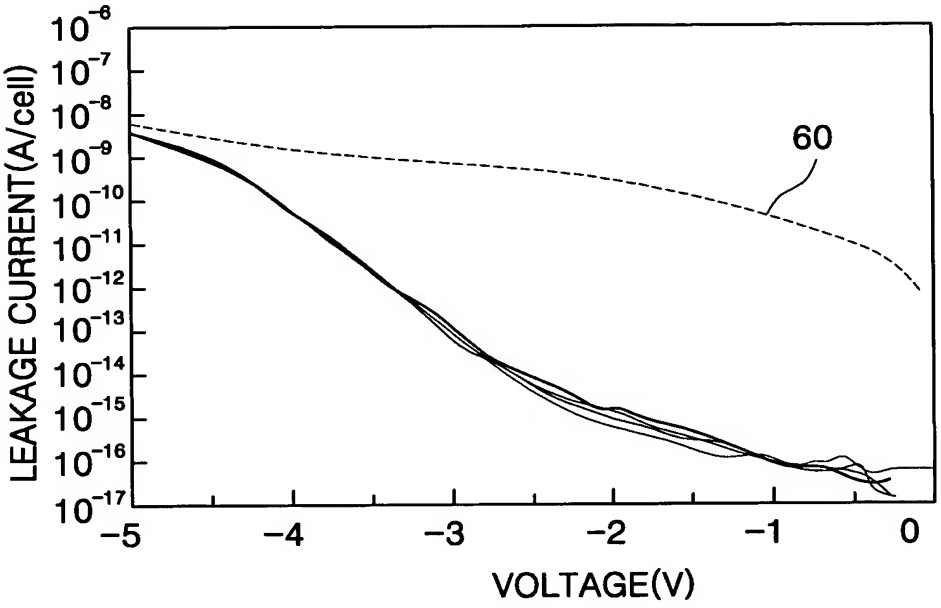

LEAKAGE CURRENT(A/cell)
10^{-6}
10^{-7}
10^{-8}
10^{-9}
10^{-10}
10^{-11}
10^{-12}
10^{-13}
10^{-14}
10^{-15}
10^{-16}
10^{-17}
60
−5
−4
−3
−2
−1
0
VOLTAGE(V)

FIG.4B

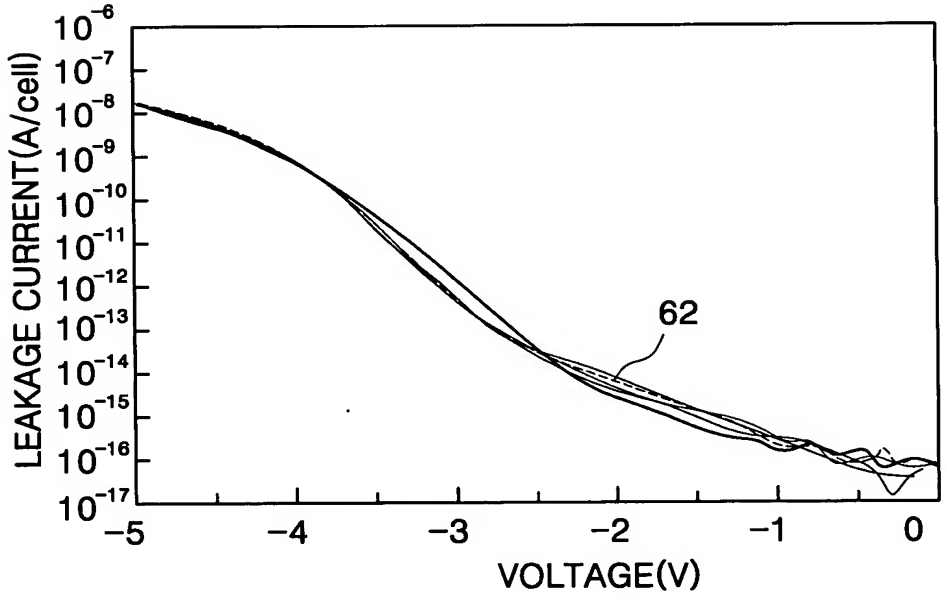

LEAKAGE CURRENT(A/cell)
10^{-6}
10^{-7}
10^{-8}
10^{-9}
10^{-10}
10^{-11}
10^{-12}
10^{-13}
10^{-14}
10^{-15}
10^{-16}
10^{-17}
62
−5
−4
−3
−2
−1
0
VOLTAGE(V)

FIG.5

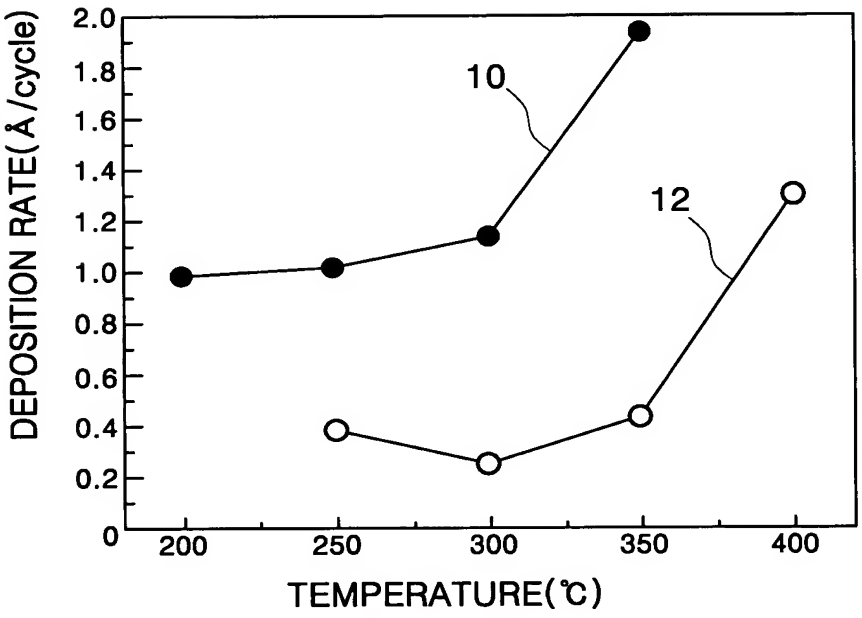

DEPOSITION RATE(Å/cycle)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
200
250
300
350
400
TEMPERATURE(℃)
10
12

FIG.6

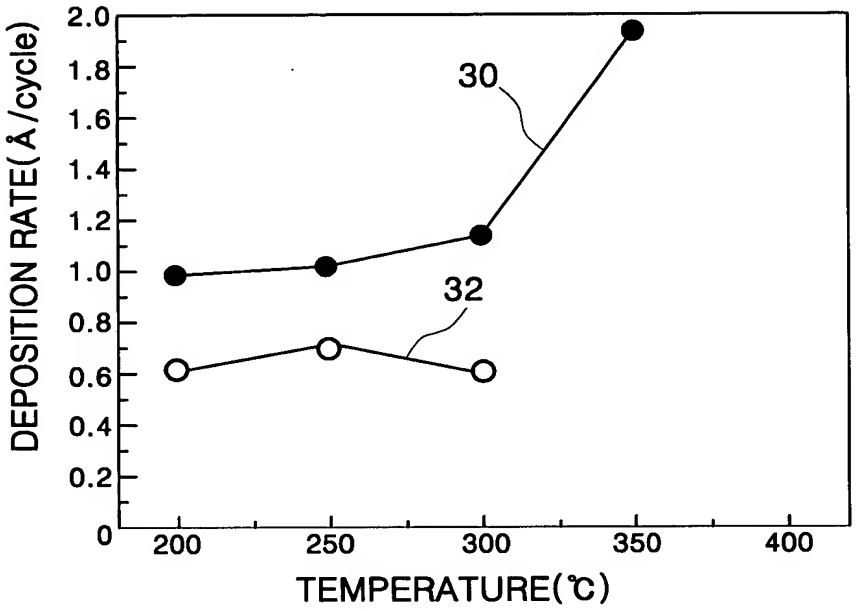

DEPOSITION RATE(Å/cycle)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
200
250
300
350
400
TEMPERATURE(℃)
30
32

FIG.7

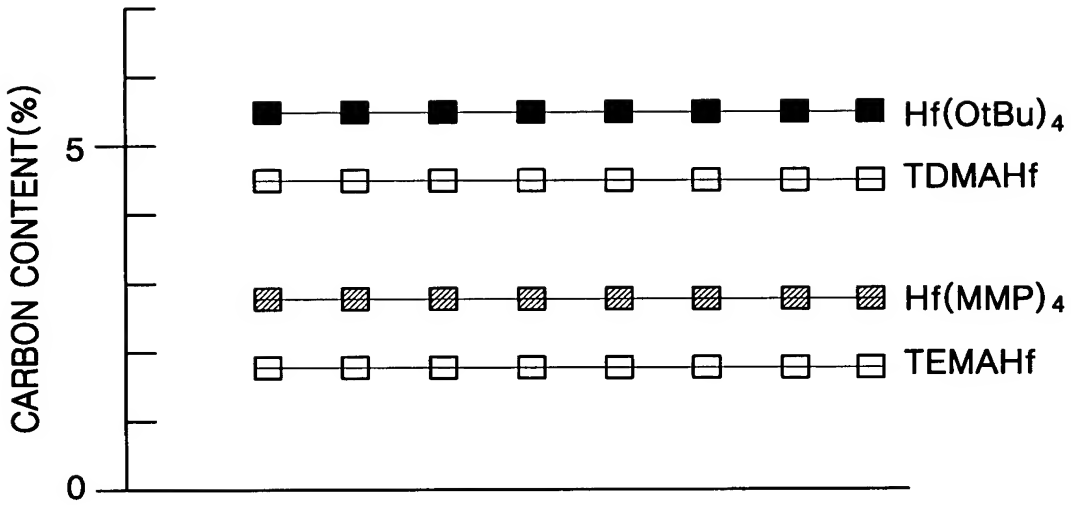


FIG.8A

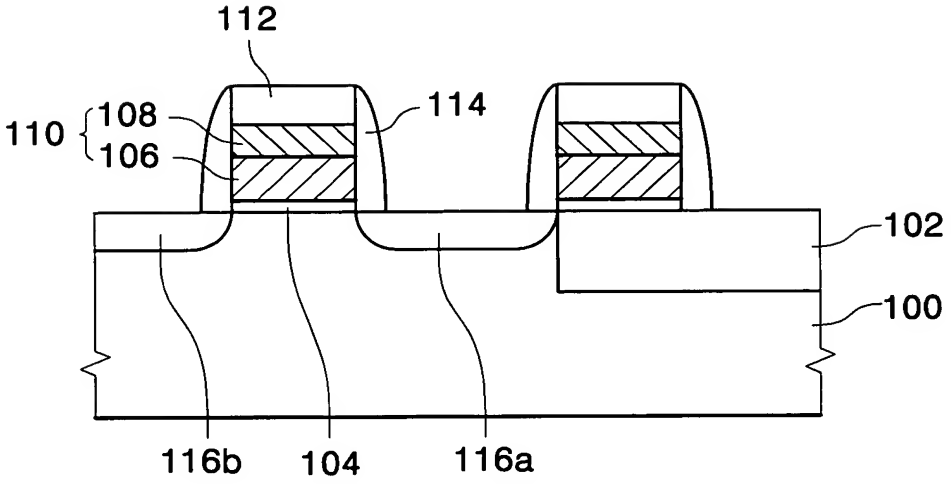

112
110
108
106
114
102
100
116b
104
116a

FIG.8B

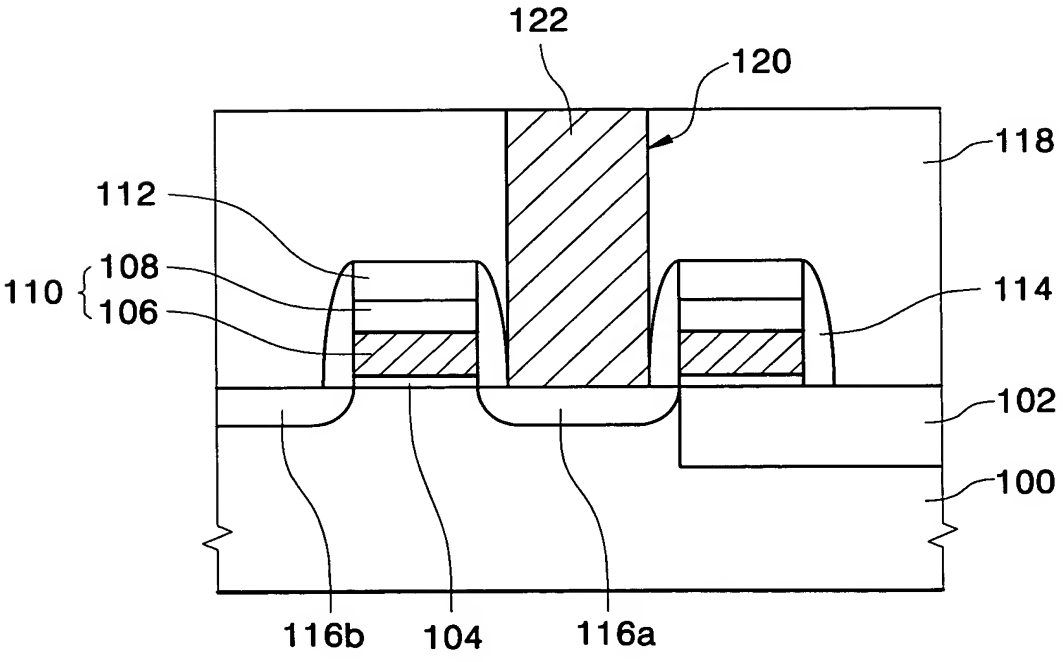

122
120
118
112
110
108
106
114
102
100
116b
104
116a

FIG.8C

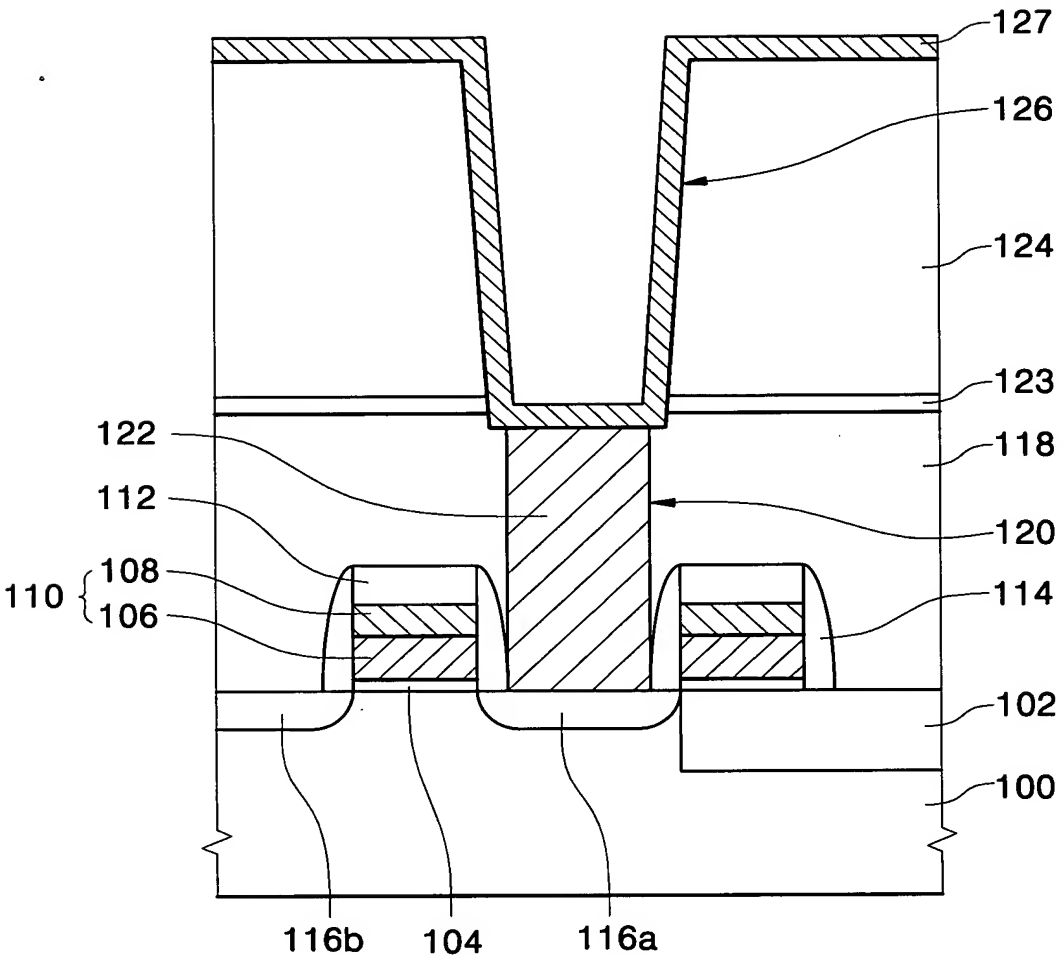

127
126
124
123
122
118
112
120
110
108
106
114
102
100
116b
104
116a

FIG.8D

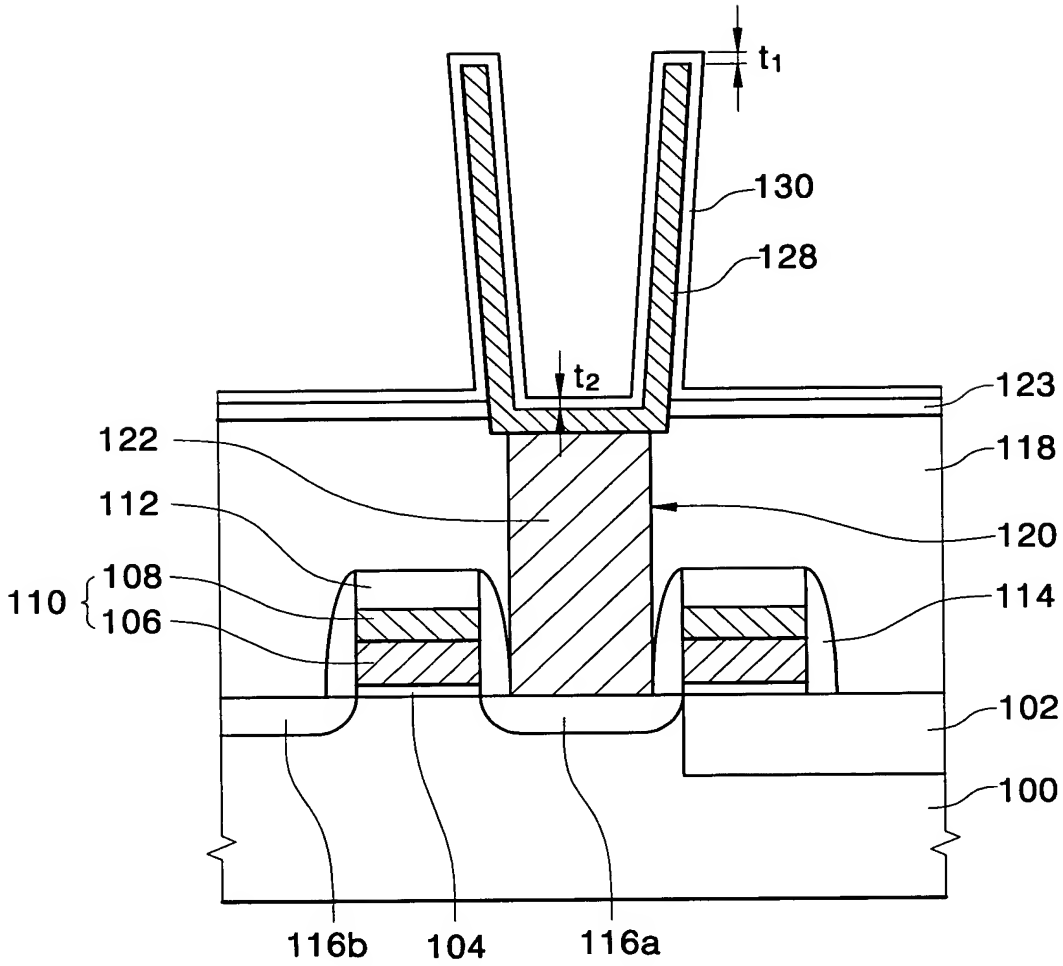

t1
130
128
t2
123
122
118
112
120
110
108
106
114
102
100
116b
104
116a

FIG.8E

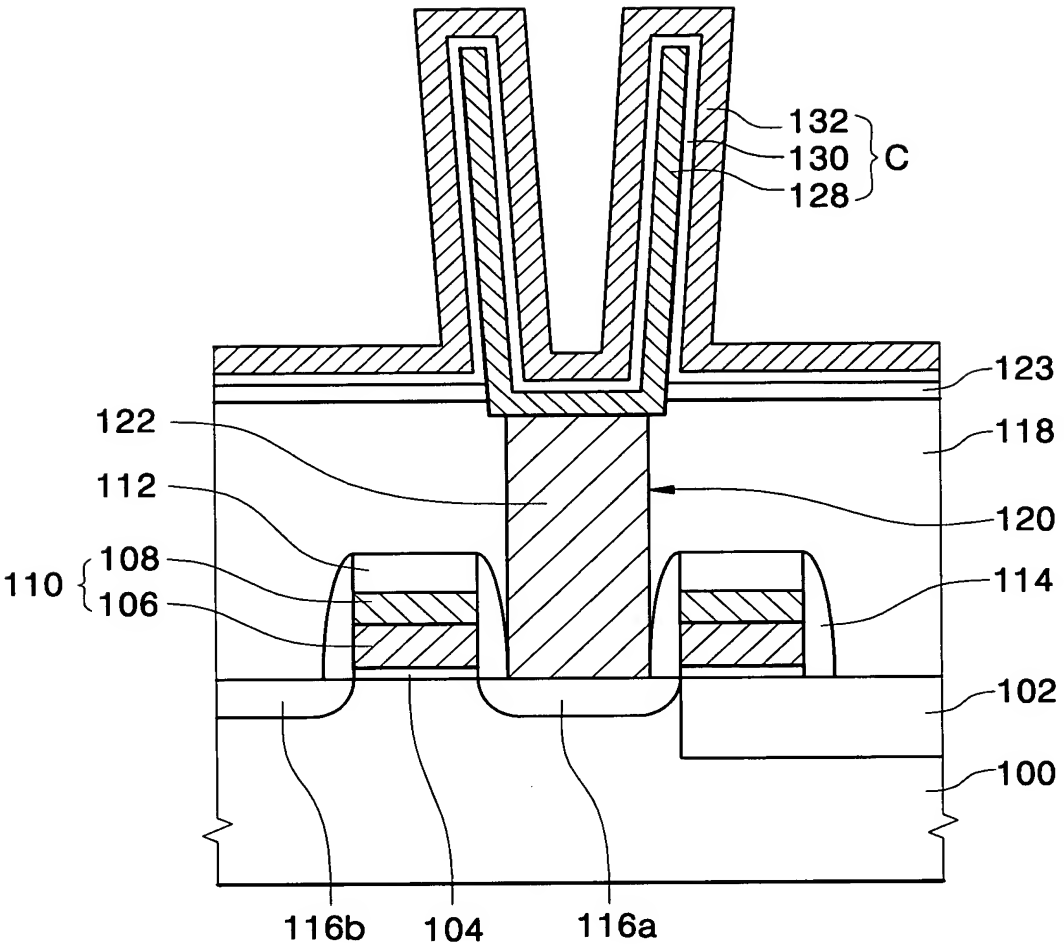

132
130
128
C
123
122
118
112
120
110
108
106
114
102
100
116b
104
116a

FIG.9

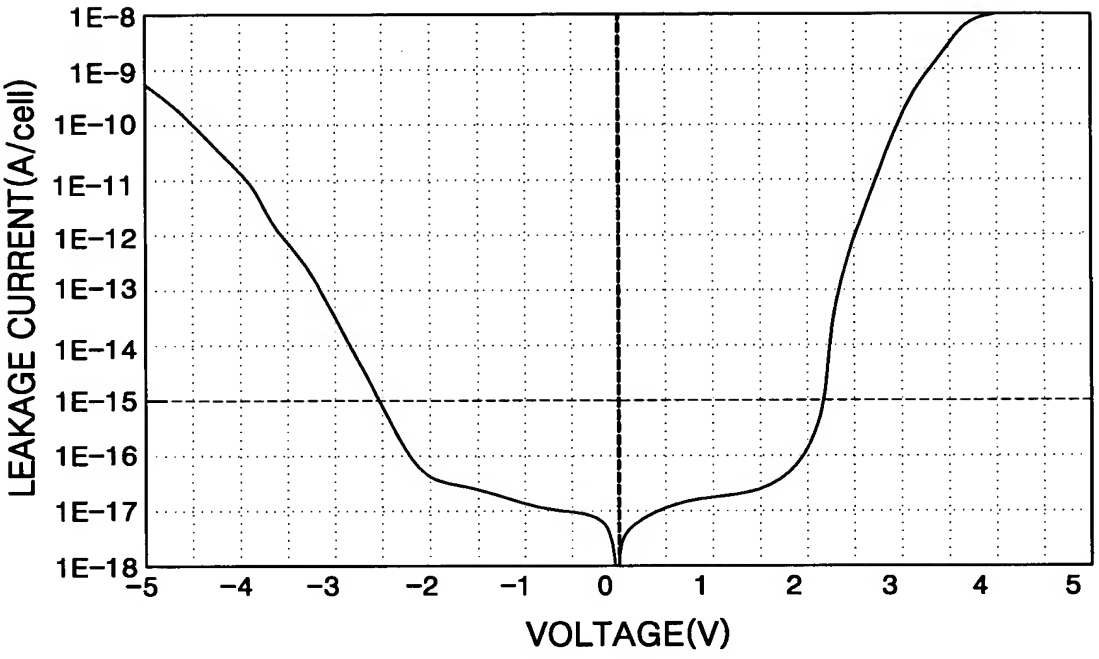
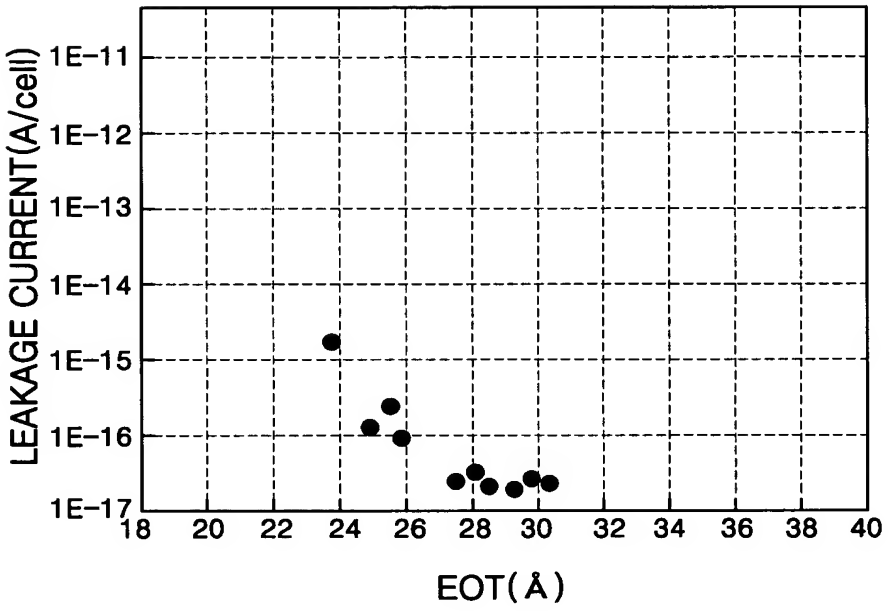

LEAKAGE CURRENT(A/cell)
1E-8
1E-9
1E-10
1E-11
1E-12
1E-13
1E-14
1E-15
1E-16
1E-17
1E-18
-5
-4
-3
-2
-1
0
1
2
3
4
5
VOLTAGE(V)

FIG.10


LEAKAGE CURRENT(A/cell)
1E-11
1E-12
1E-13
1E-14
1E-15
1E-16
1E-17
18
20
22
24
26
28
30
32
34
36
38
40
EOT(Å)